

XXX.

SWINE PLAGUE OR HOG CHOLERA.

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The history of creation teaches that man was the last and best, the crowning work of the Creator; and next to man, in reverse order, God created the beasts of the field, and said, "Let man have dominion over them." Thus, by Divine appointment, these animals became the subjects of his power and the objects of his care. Our earliest knowledge proves that property among men consisted in cattle, and a man's wealth was estimated by the number of his flocks and herds. The ancients deified their cattle; the Israelites worshipped a golden calf; and the Orientals of to-day bow in adoration to the sacredox.

The study of the various forms of animal life has developed the science of zoölogy, and the whole animal creation has been classified, and each assigned to its proper order, race, and species. And so complete is this science, that, by the knowledge of comparative anatomy, the naturalist is enabled from a simple bone to determine the race and species to which the animal belonged, and to tell you the form, size, and habits of this animal, and, if extinct, he will name the geological period to which it belonged.

Stock culture or stock-breeding has advanced to the proportions of a science; and not only have there been marked improvements in the general qualities of the herd, but cattle are bred with reference to certain purposes. Herefords and Durhams approach to perfection if beef products, as do the Jerseys in the production of milk. Horses are likewise scientifically bred for a purpose, and we have in the Norman draft-horse the type of perfection in strength and beauty; and by skilful breeding and training, the fast trotting horse of to-day has become the wonder of the world. And the unsightly, lank, long-nosed, slab-sided, bristling, squealing hog of the last century no more compares with the symmetrically rotund and really beautiful swine of to-day, than does the wild grape of the forest compare with the luscious fruit of the vineyard.

It is the province of a department of this association, by scientific investigation and earnest effort, to collect facts and to suggest methods for suppressing contagious diseases among domesticated animals. Swine plague or hog cholera undoubtedly appeared in this country as early as 1860. It was not then regarded as a contagious disease, and received no general attention or public notice until fifteen years later, or about 1875.

At this time its wide-spread proportions and fatally destructive character began to cause great consternation throughout the pork-producing regions of the North-west, as it was estimated that the loss to the producers from this disease amounted to the enormous sum of \$15,000,000 annually. In this emergency congress appropriated \$10,000 to be placed in the hands of the commissioner of agriculture for the purpose of investigating diseases of domesticated animals. The commissioner, finding that the loss of swine was greater in numbers and value than that of all other animals combined, wisely determined to expend the greater part of this appropriation for investigations in this direction. He therefore appointed one examiner in each of the seven states where this disease was most prevalent.

These examinations and reports have done great credit to the authors, and rendered most valuable service to the country. I am indebted to these reports for many statements herewith presented. In comparing the observations made in these several and widely separated localities, we are enabled to establish the fact that swine plague, like measles or small-pox, is a disease, *sui generis*, having the same characteristic symptoms and pathological appearances in all localities and at all seasons. As cholera or yellow fever prevails most in densely-populated districts or in cities, so this disease has prevailed almost exclusively in the corn and pork producing regions of the North-west, and that not on account of any climatic or inherent local causes, but because of abundance of material on which it may be fed and developed. This disease may prevail at any season of the year; and while it is more contagious and fatal in summer, it is by no means exterminated or suppressed by the frosts of winter.

A multitude of *post-mortem* examinations have revealed in all cases essentially the same pathological conditions. The seat of the disease is not restricted to any organ or set of organs, but may be found in the lungs, in the pleura, in the heart, in the liver or spleen, in the lymphatic system, in all mucous membranes, especially the intestines. In all cases the lungs and lymphatic glands are affected, as is generally the case with the intestines. The increased temperature of the body is the most constant and unvarying symptom of the disease, the thermometer indicating 104°, 106°, and in one instance 111°. In the widely separated regions in which examinations were made, the following external symptoms were observed and concurrently reported: Dulness of the eyes; lids partly closed, with an accumulation of secretion in the corners. There is hanging of the head with lopped ears, and an inclination to hide in the litter and lie on the belly and keep quiet. As the disease advances the animal manifests more or less thirst, some cough, and a pink blush or rose-colored spot and papular eruption appear on the skin, particularly along the belly, inside of the thighs and fore legs, and about the ears. There is accelerated respiration and circulation, increased action of the flanks in breathing, tucked up abdomen, arched back, swelling of the vulva in the female, as in heat, occasionally also of the sheath of the male, loss of appetite, and tenderness of the abdomen, sometimes

persistent diarrhœa, but generally obstinate constipation. In some cases large abraded spots are observed at the projecting point of the body caused by separation and loss of the epidermis. In such cases a slight blow or friction on the skin is sufficient to produce such abrasions. Some animals emit a very offensive odor even before death. In large herds, where the disease prevails extensively, this offensive effluvia can be detected for a great distance to the windward. In nearly all cases there is a weakness or partial paralysis of the posterior extremities, and occasionally this paralysis is so complete in the first stages of the disease as to prevent walking or standing.

As symptoms of special diagnostic value, which are scarcely ever absent in any case, the following are mentioned: Drooping of the ears and of the head, more or less coughing, dull look of the eyes, staring appearance of the coat of hair, partial or total want of appetite for food, vitiated appetite for excrements, rapid emaciation, great debility, weak and undecided and frequently staggering gait, great indifference to surroundings, tendency to lie down in a dark corner, and to hide the nose and even cover the whole head in the bedding, the specific offensive smell, and the peculiar color of the excrements. This last symptom is always present, at least in an advanced stage of the disease, no matter whether constipation or diarrhœa is existing. Among other characteristic symptoms, which are not present in every animal, may be mentioned frequent sneezing, bleeding from the nose, swelling of the eyelids, accumulation of mucus in the inner canthi of the eyes, attempts to vomit, or real vomiting, accelerated and difficult breathing, thumping or spasmodic contraction of the muscles, and a peculiar faint and hoarse voice in the last stages of the disease. The duration of the disease may be from one or two days to as many weeks, according to the severity and location of the attack, as well as the age and constitution of the patient. When the attack is violent, and located in some vital organ, the disease may terminate in a single day; but in vigorous subjects, with milder attacks not involving the heart, one or two weeks intervene before death. Young pigs most certainly and speedily perish. Convalescence is very slow in cases that do not terminate fatally. Recovery is seldom complete, and these enfeebled constitutions make in development but poor returns for the food consumed. The attack is always most fatal when large numbers of animals are crowded into filthy enclosures. The question as to the contagious or non-contagious character of the disease is fully settled. Numerous carefully conducted experiments have fully demonstrated the fact that it is both contagious and infectious, and that it is not confined to swine alone, but that other animals may contract it in a mild form, and transmit it to swine with unmitigated virulence.

Dr. Detmers, in his investigations, appears to have discovered a new order of bacteria, which he named *bacillus suis*, as being peculiar to this disease of swine, or more properly regards it as the swine plague "schizophytæ;" for, failing to inoculate healthy animals with virus from which these germs had been removed, he concludes that these

schizophytae are the true seeds of swine plague. These germs, being formed in all fluids, in the urine, blood, and mucus, in the excrements and in all diseased tissues, are regarded as the true infectious principle. The presence of such immense numbers of these germs in the excrements and other morbid products of swine, leads to the conclusion that they are undoubtedly the principal disseminators of the plague. The vitality of these germs in substances undergoing decomposition is soon lost, but in a suitable substance of fluid, like water containing a slight mixture of organic matter, as in brooks and ponds, their vitality is retained for several weeks. These germs, when dried in the open air, retain their vitality for many days. Numerous experiments have been made by inoculating healthy animals with morbid secretions which had been kept in a dry state for five and six days, and in one instance for twenty-six, and in each case the disease was promptly developed. A specimen of dried mucous membrane was preserved for thirty days in dry bran, when it still manifested vitality by developing the disease. Freezing does not impair the vitality of these germs. This is proven by experiments with virus which had been frozen for one and two days, and from which the disease was unfaillingly developed by inoculation. Two years ago last October an acquaintance of mine, in Berrien county, Mich., lost his entire stock of hogs by swine plague. In January, over two months later, he purchased a fresh and healthy lot of hogs, and put them in the pens recently vacated. In a few days the plague reappeared, and with such malignity that all of these also soon died. As there was no opportunity for these hogs to have been previously exposed, it is evident that they were infected from virus which had been frozen and preserved for over sixty days. Indeed, if freezing does not destroy these germs, it must follow that while frozen they are effectually preserved, since, in this condition, decomposition is effectually prevented or arrested. On the other hand, warmth, moisture, and air, conditions which favor decomposition of organic substances, are most destructive to these germs.

The stage of colonization or development of these schizophytae, is considered the period of incubation of the disease, and requires from five to fifteen days—generally about seven days.

The infectious principle from which swine plague is developed may be introduced into the system by food or drink taken into the stomach, or it may be taken into the circulation directly from external wounds. It is believed that the germs of this disease may be carried through the air for the distance of one or two miles, but that they are harmless if falling on the unabraded external surface of the body, or on perfectly healthy lung tissues. All external sores or abrasions constitute ports of entry for the disease, by which it more readily invades the organism than by the stomach.

As a preventive measure, therefore, all cuts, sores, or abrasions that may be observed should be kept closed by an application of tar, or some other substance impervious to air and water. It is probable that the

abominable nose-ring, by keeping an abraded surface in a locality that is constantly exposed to any existing contagious influence, is a most dangerous cause of disease.

In warm weather stagnant pools of water breed disease germs, and are a fruitful source of danger. The flesh of animals which die of this disease is highly infectious previous to the stage of decomposition. Rats and mice may contract this disease, and, if eaten by hogs, transmit the same. Old straw stacks, or other porous substances, may absorb and retain these disease germs as a source of danger for weeks and months. The dried excretions of diseased animals in ships and freight cars retain these dangerous germs indefinitely.

Cleanliness and care, as to all surroundings, must be observed. Some authorities recommend, as a preventive measure, the feeding of sulphur, salt, or ashes, or that these substances be placed in the reach of swine. This plague seems to produce, in those animals which have recovered from it, comparative immunity against subsequent attacks; and in those exceptional cases where the disease has appeared a second or third time, each subsequent attack has exhibited much less severity. These facts led to the presumption that inoculation, with a modified virus, would render valuable service, at least in modifying the severity of the attacks. Experiments in this direction have proven at least partially successful. Great difficulty is experienced, however, in procuring a virus of sufficient virulence to give general success in developing the characteristics of the disease, without in some instances developing the fatal malady. Inoculation, as a preventive measure, is in its present state of development impracticable. It is further believed that such efforts at prevention, instead of finally suppressing the disease, would tend rather to foster and perpetuate the same.

As a preventive, the use of *carbolic acid* seems to be the most practical, scientific, and successful means yet proposed. Its manner of administration and use comes within the reach and comprehension of the masses. Its success is indisputable. All animals treated with this remedy for two or three weeks, derived perfect immunity from the plague by inoculation or infection. It is not claimed that it is a curative remedy when the disease has developed organic changes in the organism, but it must preoccupy the system, and intercept the disease.

The dose recommended is ten drops to each 100 pounds' weight of the animal, to be given three times a day. A solution of this acid should be freely sprinkled about the premises.

But, finally, a system of vigorous pruning is indispensable. Remove or destroy the sick. Separate the healthy into small herds, and remove them to fresh pastures. Then give them the carbolic acid treatment, and they will live.